

Process for the production of polyunsaturated fatty acids in transgenic plants

Abstract

5 The present invention relates to a process for the production of polyunsaturated fatty acids in the seed of transgenic plants for introducing, into the organism, nucleic acids which encode polypeptides with ω 3-desaturase, Δ 12-desaturase, Δ 6-desaturase, Δ 6-elongase, Δ 5-desaturase, Δ 5-elongase and/or Δ 4-desaturase activity, preferably polypeptides with Δ 6-desaturase, Δ 6-elongase and Δ 5-desaturase activity. The nucleic acid sequences are the sequences shown in SEQ ID NO: 11, SEQ ID NO: 27, SEQ ID NO: 193, SEQ ID NO: 197, SEQ ID NO: 199 and SEQ ID NO: 201.

15 These nucleic acid sequences can advantageously be expressed in the organism, if appropriate together with further nucleic acid sequences which encode polypeptides of the biosynthesis of the fatty acid or lipid metabolism. Especially advantageous are nucleic acid sequences which encode a Δ 6-desaturase, a Δ 5-desaturase, Δ 4-desaturase, Δ 12-desaturase and/or Δ 6-elongase activity. These desaturases and elongases originate advantageously from *Thalassiosira*, *Euglena* or *Ostreococcus*. Furthermore, the invention relates to a process for the production of oils and/or triacylglycerides with an elevated content of long-chain polyunsaturated fatty acids.

25 In a preferred embodiment, the invention furthermore relates to a process for the production of arachidonic acid, eicosapentaenoic acid or docosahexaenoic acid and to a process for the production of triglycerides with an elevated content of unsaturated fatty acids, in particular arachidonic acid, eicosapentaenoic acid and/or docosahexaenoic acid, in transgenic plants, advantageously in the seed of the transgenic plant. The invention relates to the generation of a transgenic plant with an elevated content of polyunsaturated fatty acids, in particular arachidonic acid, eicosapentaenoic acid and/or docosahexaenoic acid, as the result of the expression of the elongases and desaturases used in the process according to the invention.

35 The invention furthermore relates to recombinant nucleic acid molecules comprising the nucleic acid sequences which encode the polypeptides with Δ 6-desaturase, Δ 6-elongase, Δ 5-desaturase and Δ 5-elongase activity, either jointly or individually, and transgenic plants which comprise the abovementioned recombinant nucleic acid molecules.

A further part of the invention relates to oils, lipids and/or fatty acids which have been produced by the process according to the invention, and to their use. Moreover, the

invention relates to unsaturated fatty acids and to triglycerides with an elevated content of unsaturated fatty acids and to their use.